

Article

Climate change insights, families and households, UK: August 2022

Quarterly publication bringing together the latest climate change-related statistics and analysis from a range of sources.

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1 . Main points

- Households are a big emitter of greenhouse gases, accounting for 26% of total emissions in the UK, on a residency basis.
- In 2020, Northern Ireland had the highest domestic emissions per capita and London the highest per square kilometre.
- Around a third of adults (34%) who have made no changes to their lifestyle to tackle climate change think that large polluters should make changes before individuals.
- The number of licensed zero emission vehicles, ultra-low emission vehicles, and plug-in vehicles has increased by 71% or more in the last year (Quarter 1 (Jan to Mar) 2022 compared with Quarter 1 2021) in the UK.
- Winter, spring, and summer 2022 were warmer and drier than average. A heatwave in July 2022 brought record high temperatures for England, Scotland, and Wales.

2 . Emissions and drivers: families and households

UK residency-based emissions

The Office for National Statistics (ONS) [Environmental Accounts](#) show, that on a residency basis, households are bigger emitters of greenhouse gases than any industry sector. There are three measures of UK emissions – residence, territorial, and footprint. A description of these and their differences is outlined in the [Measuring UK greenhouse gas emissions article](#) on the UK Climate Change Statistics Portal.

Household emissions are labelled as "consumer expenditure" in the Environmental Accounts. They mainly relate to emissions from domestic travel and heating, but do not include emissions from electricity use. These emissions accounted for 26% of all residence-based emissions in 2020 with just under half of these (43%) relating to travel.

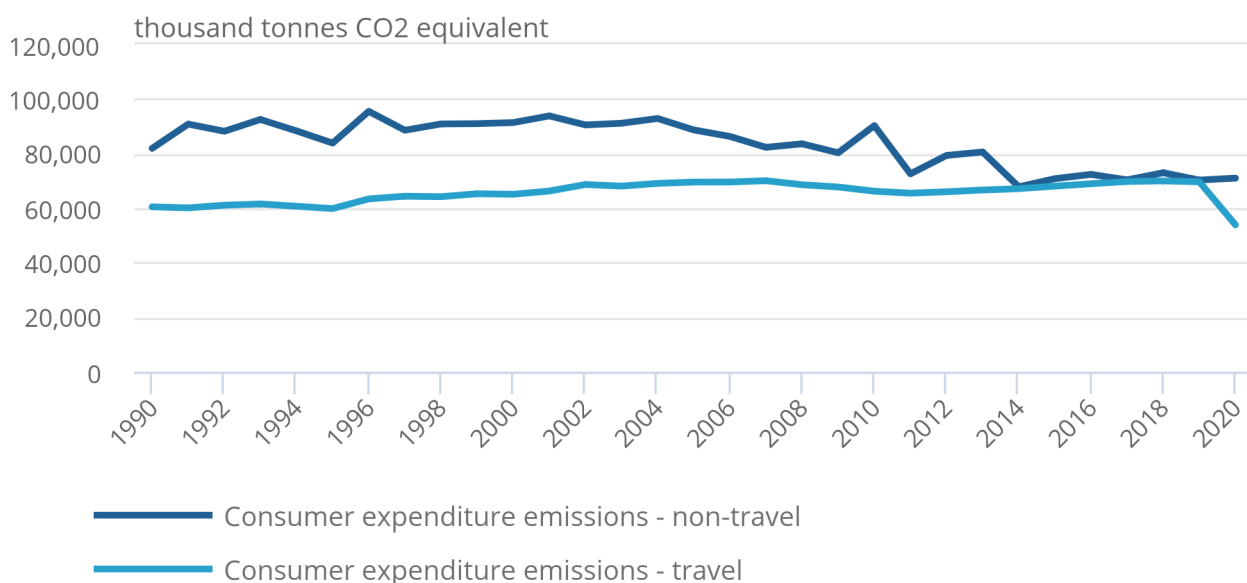
Total household emissions remained relatively stable up to 2019 and were 1.7% lower in 2019 than in 1990. Household emissions from travel have been increasing since the mid-1990s, but levels dropped below 1990 levels for the first time in 2020. Between 2019 and 2020 there was a fall of 23%, mostly because of coronavirus (COVID-19) travel restrictions. In contrast, emissions from non-travel sources have been declining over the long term.

Figure 1: Long-term declines in non-travel greenhouse gas emissions (residence-based) from UK households contrast with a steady increase in emissions from household travel

1990 to 2020

Figure 1: Long-term declines in non-travel greenhouse gas emissions (residence-based) from UK households contrast with a steady increase in emissions from household travel

1990 to 2020



Source: Ricardo Energy and Office for National Statistics - atmospheric emissions

Notes:

1. Data refer to consumer expenditure emissions in the environmental accounts. Non-travel related emissions are from the consumption of fuels and other products by individuals in the UK, as opposed to the production of these by industry. Travel-related emissions consists almost entirely of road transport emissions.
2. The Air Emission Accounts include only direct residency-based emissions, defined as "scope 1" under the [greenhouse gas \(GHG\) protocol guidance](#).

Regional territorial-based emissions

The Department for Business, Energy and Industrial Strategy (BEIS) produces emissions estimates on a territorial basis at a regional level. Residence-based emissions from the Environmental Accounts are only available at UK level. BEIS' domestic emissions figures report on emissions from residential properties, including from supplying energy to them and from consumer product use. Emissions primarily consist of fuel combustion for heating or cooking, supplying electricity to residential properties (not included in the Environmental Accounts) and for garden machinery.

The latest [UK local authority and regional greenhouse gas statistics](#) released in June 2022 show the South East had the highest level of overall territorial-based domestic emissions. However, there is considerable variation in emissions across the UK (Figure 2), most likely because of population size, density, and distribution of housing types. For example, [dwelling stock estimates in England](#) found that there was a mean of 1.91 dwellings per hectare in 2021, but this was as high as 73 dwellings per hectare in Kensington and Chelsea and as low as 0.13 dwellings per hectare in Eden (Cumbria).

Accounting for population size, Northern Ireland had the highest level of domestic emissions per capita and London the lowest. Accounting for area, London had the highest emissions per km², and Scotland the lowest.

Figure 2: Domestic greenhouse gas emissions by region

Overall emissions, emissions per capita, and emissions per square kilometre

Source: Department for Business, Energy and Industrial Strategy - UK local authority and regional greenhouse gas emissions national statistics

Notes:

1. Data on domestic emissions per capita and per km² have been calculated using population and area statistics included in the original dataset.
2. Data are based on territorial emissions and do not include emissions from domestic transport.

Download this chart

[.xlsx](#)

As well as population, the housing stock of the region is likely to have an impact on carbon emissions. [The age of a property is the biggest single factor in the energy efficiency of homes](#) according to the ONS. Newer homes (those built after 2012) are over 300 times more likely to have a band A to C energy efficiency rating in Wales, and almost 200 times more in England, than properties built before 1982.

Our [energy efficiency of housing in England and Wales: 2021 article](#) shows variation in energy efficiency by property type. Flats and maisonettes had the highest median energy efficiency ratings (72, band C), while detached homes had the lowest (62 in Wales, 63 in England, both band D). Homes that are socially rented had the highest energy efficiency ratings regardless of property type.

The proportion of social housing with an energy efficiency rating of band C or above compared with all dwellings, per UK nation, is:

- in Northern Ireland, 79% of social housing compared with 49% of all dwellings ([Home Energy Conservation Authority Annual Progress Report 2021 \(PDF, 8.975KB\)](#))
- in Wales, 56% of social housing compared with 37% of all dwellings ([energy efficiency of housing in England and Wales: 2021 article](#))
- in Scotland, 56% of social housing compared with 45% of all dwellings ([Scottish house conditions survey: 2019 key findings](#))
- in England, 54% of social housing compared with 42% of all dwellings ([energy efficiency of housing in England and Wales: 2021 article](#))

Socially-rented housing accounted for the following proportion of dwellings:

- 16% in Wales ([dwelling stock estimates in Wales in 2020](#))
- 17% in England ([dwelling stock estimates in England 2021](#))
- 23% in Scotland ([Scotland housing statistics in 2020](#))
- 16% in Northern Ireland ([Northern Ireland housing statistics in 2021](#))

3 . Moving towards net zero (actions and behaviours): families and households

Homes

Results from the heat and energy in the home section of the [June 2022 Department for Business, Energy and Industrial Strategy \(BEIS\) Public Attitudes Tracker \(PDF, 4.585KB\)](#) suggest that almost a quarter (24%) of the public have never heard of an energy performance certificate (EPC). Of those who have, less than a third (27%) are aware the EPC provides recommendations on energy efficiency improvements.

The latest [English Housing Survey](#), [Scottish House Condition Survey](#) and [Welsh Housing Conditions Survey](#) all found that the energy efficiency of the housing stock has been improving over time. Variation in energy efficiency of housing depends on property age and type, mainly because of the extent of energy efficient measures in place (for example, loft insulation, cavity wall insulation, underfloor insulation, double glazing, or upgraded boilers).

According to a recent [Opinions and Lifestyle Survey](#) (22 September to 3 October 2021) less than a fifth of people in Great Britain (19%) were considering improving their home's energy efficiency. Of those who were not considering any improvements, the most common reason for this was believing their home was already efficient enough (35%), followed by not owning their own home (29%), and changes costing too much money (28%).

In addition to improving home energy efficiency, new data from the Opinions and Lifestyle Survey (20 to 31 July 2022) show that 77% of adults have made some or a lot of changes to their lifestyle to help tackle climate change. Around 7 in 10 (72%) of women reported making some changes to their lifestyle to help tackle climate change, compared with 6 in 10 (62%) men. Among those who said they have made no change to their lifestyle to help tackle climate change (23%), the most common reasons for this were (Figure 3):

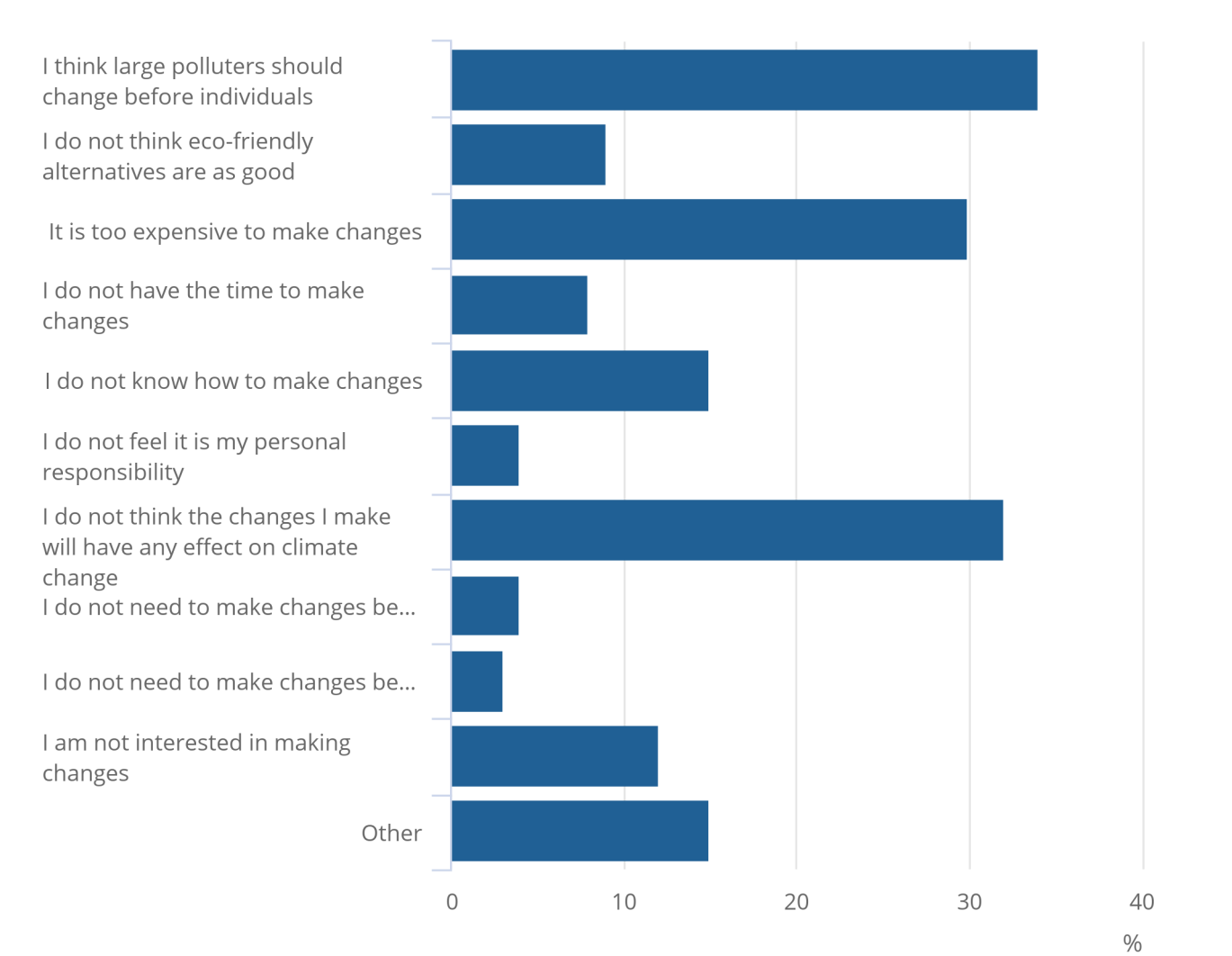
- the belief that large polluters should make changes before individuals (34%)
- feeling that their changes will have no effect (32%)
- too expensive to make changes (30%)

Figure 3: Among those who have made no changes to their lifestyle to tackle climate change, 34% think large polluters should make changes before individuals

Reasons reported among adults who said they had made no changes to help tackle climate change, Great Britain, 20 to 31 July 2022

Figure 3: Among those who have made no changes to their lifestyle to tackle climate change, 34% think large polluters should make changes before individuals

Reasons reported among adults who said they had made no changes to help tackle climate change, Great Britain, 20 to 31 July 2022



Notes:

1. Question – For what reasons have you not made changes to your lifestyle to tackle climate change?
2. Base: Adults who said they have made "no changes" to the question: "To what extent have you made changes to your lifestyle to help tackle climate change?".
3. Respondents were allowed to select more than one option so percentages will not sum to 100%
4. Confidence intervals for the estimates shown in this chart are available within the dataset published with this release.

Travel

Given that 43% of household emissions come from transport (see Section 2), changes in the mode of transport options can have an impact on household greenhouse gas (GHG) emissions.

The latest [transport statistics for Great Britain](#) show that car use is still the predominant form of travel. Policies to limit the impact of coronavirus (COVID-19) had a major impact. A fall in travel by public transport and air in 2020 accounts for the biggest single year increase in the proportion of passenger kilometres travelled by car since records began in 1952 to 92% (up 7 percentage points), in 2020. This comes despite a fall of 33% in total domestic passenger kilometres travelled compared with 2019.

Prior to 2020, travel by both road and rail in Great Britain had been increasing with peaks in the annual distance travelled in 2019 and 2018 respectively. In 2019, road travel accounted for 90% of passenger kilometres travelled in Great Britain - a rise of 13% since 2000. Accounting for 9% of the total distance travelled, travel by rail rose by 73% between 2000 and 2019.

Despite reaching a peak in 2006, the annual distance travelled by air in 2019 has risen by 21% since 2000.

Personal transport

We continue to see big rises in the number of licensed cars and motorcycles that are classed as ultra-low emission vehicles (ULEVs, less than 75 grams per kilometre (g/km) of carbon dioxide (CO₂)), zero emissions vehicles (ZEVs, no CO₂ emitted), or plug-in vehicles (PiVs) (Figure 4). The Department for Transport's latest [vehicle licensing statistics](#) show an increase of 71% for ULEVs and PiVs and an almost doubling of ZEVs in Quarter 1 (Jan to Mar) 2022 compared with Quarter 1 2021. The infrastructure supporting PiVs has also grown, with 14 times more [electric vehicle charging points](#) and 30 times as many rapid devices in the UK now since 2015.

There is considerable overlap between vehicles classed as ultra-low emission vehicles, zero emission vehicles and plug-in vehicles. Figures 1 and 2 in the [vehicle licensing statistics](#) provide more detail.

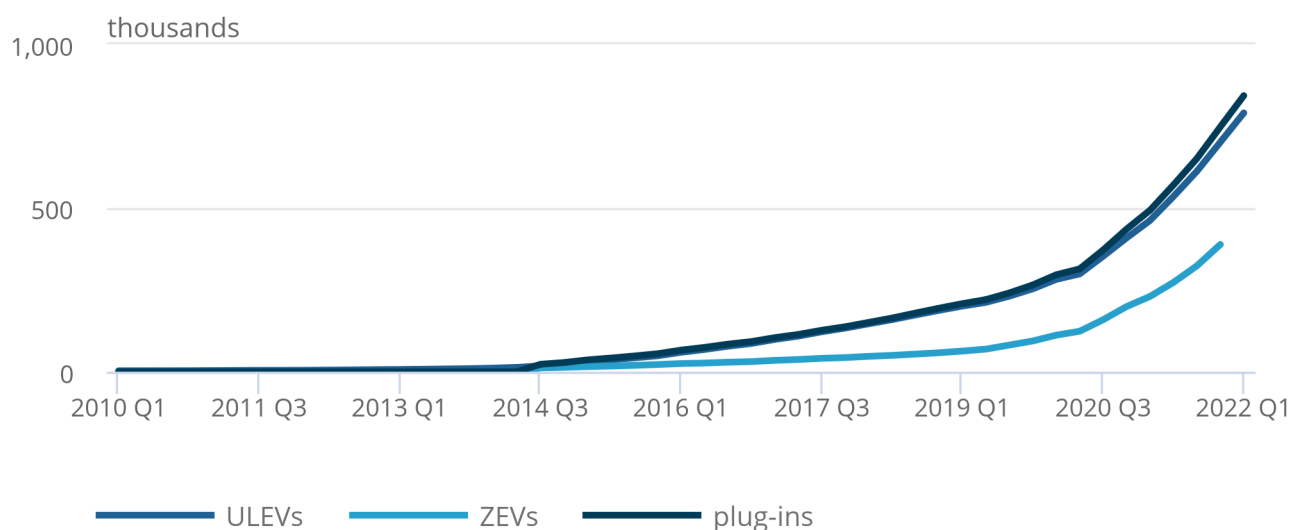
In contrast, there is a continuous steady decline in the number of licenced vehicles with emissions over 150 g/km of CO₂. There was a fall of 4% in 2020 compared with 2019, and an overall drop of 30% since 2014.

Figure 4: There has been a considerable increase in the number (in thousands) of licensed ULEVs, ZEVs and plug-in cars and motorcycles in the UK

Quarter 1 (Jan to Mar) 2010 to Quarter 1 2022

Figure 4: There has been a considerable increase in the number (in thousands) of licensed ULEVs, ZEVs and plug-in cars and motorcycles in the UK

Quarter 1 (Jan to Mar) 2010 to Quarter 1 2022



Source: Department for Transport and Driver and Vehicle Licensing Agency - Vehicle Licensing Statistics

Notes:

1. Emissions were originally determined using the New European Driving Cycle (NEDC). The Worldwide harmonised Light vehicles Test Procedure (WLTP) is a replacement laboratory test for emissions and fuel efficiency, introduced in 2015. More detail can be found in the [dataset](#).

4 . Current state of the climate in the UK

Long-term trends

Long-term trends show the [annual mean temperature in the UK](#) has increased since records began in 1884. The average temperature in the 30-year period 1991 to 2020 was 0.8°C warmer than the previous 30-year average for 1961 to 1990. The warmest three years on record have been in the last 20 years: with 2014 being the warmest followed by 2006 and 2020. Annual mean temperatures of 9.3°C in 2021 were 1.0°C above the 1961 to 1990 long-term average and 0.1°C above the 1991 to 2020 average.

UK weather is also getting wetter, with long-term trends showing an increased [average rainfall](#). There are, however, fluctuations year on year – 2020 was the fourth wettest year on record, while 2018 and 2021 recorded lower-than-average rainfall. Data and more detail can be found in the Climate and weather section of the [UK Climate Change Statistics Portal](#).

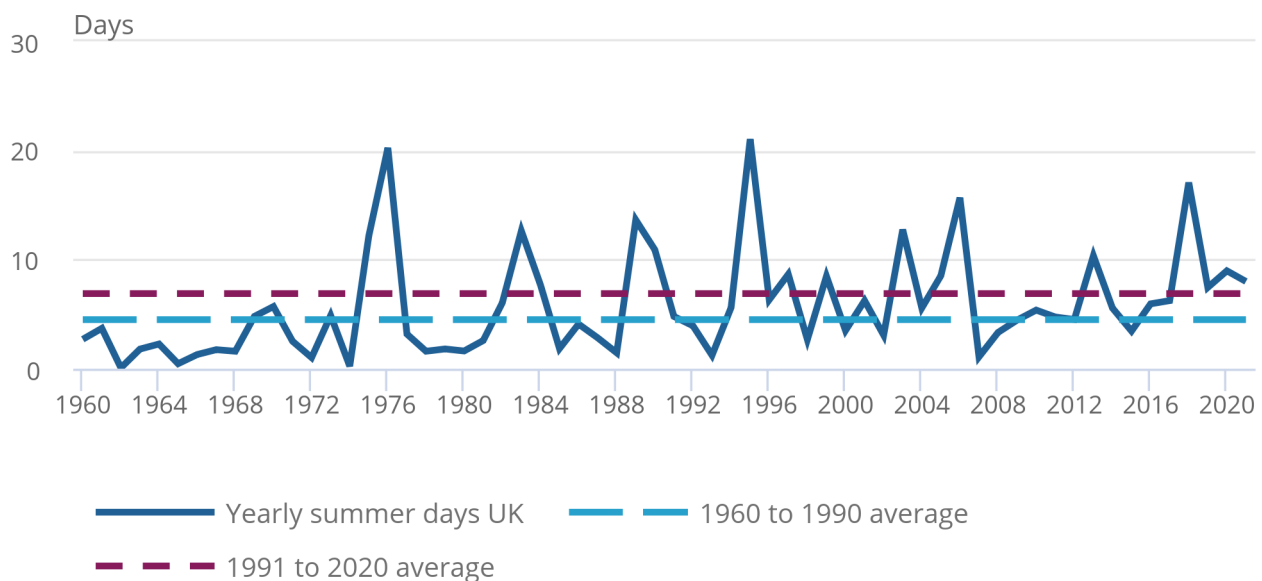
Extreme weather events in the UK are also on the rise. For the period 1991 to 2020, both the average annual number of days with a maximum temperature above 25°C (Figure 5), and the average number of days with rainfall over the 99th percentile of daily rainfall (Figure 6), rose compared with the previous 30-year average (by 53% and 22% respectively).

Figure 5: The number of summer days has increased

Count of days per month with maximum temperature above 25°C, UK, 1960 to 2021

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Count of days per month with maximum temperature above 25°C, UK, 1960 to 2021



Source: The Met Office

Notes:

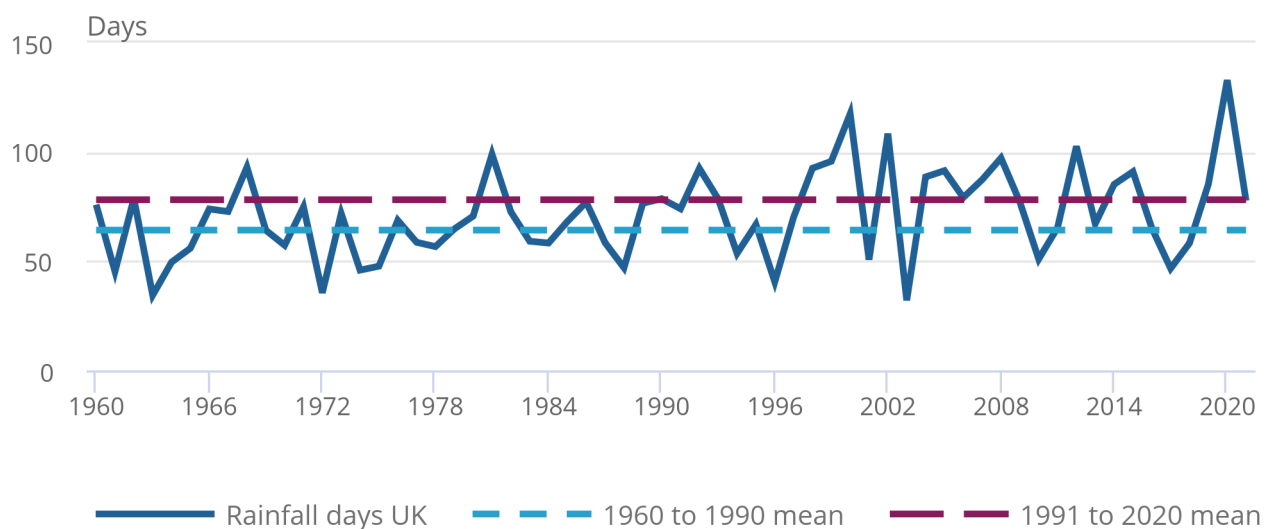
1. The data are averaged across the geography, so while the unit is “days” the statistics can be fractions because of the averaging.

Figure 6: The number of heavy rainfall days has increased

Count of days per year where the daily rainfall exceeds the 99th percentile of daily rainfall, UK, 1960 to 2021

Figure 6: The number of heavy rainfall days has increased

Count of days per year where the daily rainfall exceeds the 99th percentile of daily rainfall, UK, 1960 to 2021



Source: The Met Office

Notes:

1. The data are averaged across the geography, so while the unit is “days” the statistics can be fractions because of the averaging.

Recent weather

The Met Office found that 2022 has so far been both warmer and drier than average. The [summer seasonal assessment \(PDF, 0.6KB\)](#) (June and July 2022), [spring seasonal assessment \(PDF, 0.6KB\)](#) (March to May 2022) and [winter seasonal assessment \(PDF, 0.6KB\)](#) (December 2021 to February 2022) show the following differences compared with the 1991 to 2020 seasonal averages for UK temperature and rainfall:

- summer (so far) was 0.9°C above average with 34% less rainfall
- spring was 0.8°C above average with 24% less rainfall
- winter was 1.1°C above average with 7% less rainfall

Last month, July 2022, saw a heatwave across many parts of the UK. The Met Office issued its first “red heat alert” for much of central UK on Monday 18 and Tuesday 19 July 2022. England, Scotland, and Wales recorded their highest ever temperatures during this period: 40.3°C in Lincolnshire, 34.8°C in the Scottish Borders and 37.1°C in Flintshire. All three countries also provisionally recorded their highest ever night-time temperature: 25.9°C in Yorkshire, 21.3°C in East Lothian and 24.5°C in Ceredigion.

More recently, another [amber extreme heat warning](#) for much of England and Wales was issued by the Met Office for Thursday 11 to Sunday 14 August 2022.

5 . Impacts and signs of adaptation: families and households

Impacts of climate change include direct weather-related impacts such as heatwaves, flooding and extreme weather events on homes, local areas and personal wellbeing, as well as indirect impacts that come about through implementation of net zero strategies or adaptations.

The heatwave experienced in the UK in July 2022 not only broke temperature records, but also led to serious wildfires according to the [Met Office's unprecedented extreme heatwave, July 2022 report \(PDF, 3.633KB\)](#). Major incidents were declared by fire services in London, Leicestershire, Hertfordshire, Suffolk, Norfolk, Lincolnshire, and Yorkshire. There was also disruption to public services and electricity because of damage to infrastructure, causing power failures and cancellations of trains and flights. Our recent [How many people died in the UK's recent heatwave? blog](#) explores the relationship between mortality and the recent heatwave and we will look to provide more insight into climate and health in a future edition of the insights.

Despite recent heatwaves and dry weather, flooding continues to be a serious concern for many households and data on flooding are widely available. There has been an increase in intensive rainfall events, causing river- and surface water-flooding. The mean sea level around the UK has also risen by approximately 1.5mm per year on average since 1901, excluding the effect of natural vertical land movement, resulting in an overall rise of 16.5 centimetres over that period according to the Met Office's [State of UK Climate report \(PDF, 38.496KB\)](#).

Flooding sources include rivers, the sea, surface water and groundwater. So far in 2022, 1418 flood alerts or warnings have been issued in England ([Environment Agency Historic Flood Warnings](#), up to 4 July 2022) and 273 in Wales ([Natural Resources Wales Lle dataset. up to 4 April 2022](#)).

The number of properties at risk from flooding around the UK are:

- 2,047,912 residential properties in England ([Environment Agency's 2022 flooding data](#))
- over 245,000 properties (residential and non-residential) in Wales ([National Strategy for flood and coastal erosion risk management in Wales](#), 2020)
- 284,000 (residential and non-residential) properties in Scotland ([Living with flooding: action plan](#), 2019 data)
- approximately 45,000 (residential and non-residential) properties in Northern Ireland (latest [Flood Risk Assessment report for Northern Ireland](#) 2019 data)

Adaptations are actions taken to adjust to climate change and are currently difficult to measure. However, there are some proxy metrics that indicate how well the UK is changing the way homes, businesses, and landscapes respond to weather events.

Direct management of flood and coastal erosion risk can alleviate flooding pressures and protect properties at risk of flooding. Government spending on flood and coastal erosion in England and Wales has more than doubled since the early 2000's. In 2020 to 2021, the Department for Food and Rural Affairs' (Defra's) report on [Central Government Funding for Flood and Coastal Erosion Risk Management](#) shows that spending in England reached a high of £1,062 million (including capital and non-capital funding from Defra, Environment agency and others), with spending in Wales reaching a high of £71 million (capital and revenue) for 2022 to 2023.

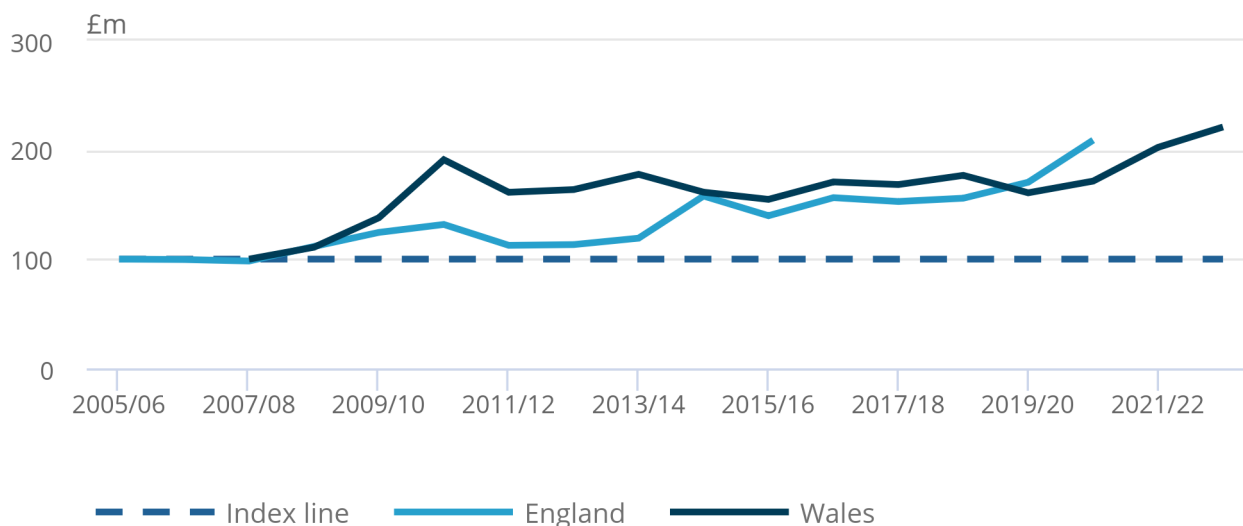
The Environment Agency estimated in its latest [flood and coastal erosion risk management report](#) that between April 2020 and March 2021, in addition to properties, its investment programme also protected around 1,537 kilometres of roads, 134 kilometres of railways and 26,136 hectares of agricultural land in England.

Figure 7: Spending on flood and coastal erosion risk management in England and Wales has more than doubled since the early 2000's.

Index = 100 for 2005 to 2006 for England and 2007 to 2008 for Wales.

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Index = 100 for 2005 to 2006 for England and 2007 to 2008 for Wales.



Source: Welsh Government, Department for Food and Rural Affairs

Notes:

1. Expenditure covers both revenue and capital.

6 . Going "Beyond GDP"

Alongside insights in May 2022, we published a [Beyond GDP workplan](#) outlining how the Office for National Statistics (ONS) is compiling new estimates of "inclusive income".

Alongside this edition of insights, we have updated the UK's [Measures of National Well-being](#) dashboard. This provides a rounded overview of the quality of life of those in the UK from ten perspectives including the environment, personal well-being, health, the economy and personal finance, among others. Looking to the autumn, the ONS will be reviewing the indicators used within the dashboard, and how to communicate them, engaging with expert users and the public to ensure it continues to provide appropriate metrics to reflect life in the UK.

7 . Climate change insights data

[Changes to lifestyle to help tackle climate change, Great Britain](#)

Dataset | Released 12 August 2022

Opinions and lifestyle survey asking about changes to lifestyle to help tackle climate change, Great Britain, 20 to 31 July 2022.

8 . Glossary

Adaptation

Adaptation is the action made to adjust to climate change and the extreme weather that it makes increasingly likely. This includes making our homes more resilient to extreme heat and cold weather or adapting our landscapes to better cope with flooding or drought events for example.

Energy performance certificate

Energy performance certificates (EPCs) are required for all buildings (domestic and non-domestic), when constructed, sold, or rented. There are some exemptions, for example buildings used as places of worship. EPCs are valid for 10 years. The EPC records how energy efficient a property is as a building, using an A to G rating scale where A is the most efficient and G is the least efficient. The certificate also lists the potential rating of the building if all the cost-effective measures are installed.

Greenhouse gases

The seven greenhouse gases included in the atmospheric emissions accounts are those covered by the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydro-fluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃). These gases contribute to global warming and climate change. The potential of each gas to cause global warming is assessed in relation to a given weight of CO₂, so all greenhouse gas emissions are measured as carbon dioxide equivalents (CO₂e).

Licensed vehicles

All vehicles that can legally use the road. This is sometimes called total stock.

Mitigation

Mitigation is the reduction of emissions of greenhouse gases which lead to global warming. This includes reducing energy consumption and changing to low emission energy sources.

Natural vertical land movement

This includes all processes that impact upon the elevation at given locations, from tectonic movements, subsidence, ground water extraction and glacial adjustments, causing land to move up or down.

Net zero

Net zero is the government's target for at least a 100% reduction of greenhouse gas emissions (compared with 1990 levels) in the UK by 2050. This can be achieved by a combination of emission reduction and emission removal.

Non-travel related emissions

These are emissions from households not related to travel comprising mostly from heating and cooling of the home.

Plug-in vehicles (PiVs)

Road using vehicles that use a plug-in technology to connect to a source of electricity.

Territorial emissions

Emission estimates compiled on a territory basis, produced within the UK's geographical borders only; by tourists, businesses and foreign transport operations but exclude emissions of UK residents aboard.

Residence-based emission

Estimates compiled on a residence basis include data relating to UK residents and UK-registered businesses, regardless of whether they are in the UK or overseas. Data relating to foreign visitors and foreign businesses in the UK are excluded.

Ultra-low emission vehicles (ULEVs)

Road using vehicles that are reported to emit less than 75 grams of carbon dioxide (CO₂) from the tailpipe for every kilometre travelled.

9 . Data sources and quality

More quality and methodology information on the strengths, limitations, appropriate uses, and how the data were created can be found in the original data sources:

- [Office for National Statistics \(ONS\) - Atmospheric emissions: greenhouse gases by industry and gas](#)
- [ONS - Data on public attitudes to the environment and the impact of climate change. Great Britain](#)
- [Department for Levelling Up, Housing and Communities - English Housing Survey 2020 to 2021](#)
- [Environment Agency - Risk of flooding from rivers and sea](#)
- [Department for Business, Energy and Industrial Strategy - Local Authority and regional greenhouse gas emissions](#)
- [Scottish Government: Scottish house condition survey: 2019 key findings](#)
- [Department for Transport: National Travel Survey](#)
- [Department for Transport: Vehicle licensing statistics: January to March 2022](#)
- [Welsh Government: Welsh Housing Conditions Survey \(energy efficiency of dwellings\): April 2017 to March 2018](#)

10 . Future developments

This is the second edition of Climate change insights, bringing together UK official statistics and indicators. We are publishing these insights alongside our first quarterly estimates of gross domestic product (GDP), the latest covering April to June 2022.

Each edition focuses on a theme, with this edition focusing on families and households. The following themes are being considered for future editions:

- land use and the natural and rural environment
- economy, business and transport
- health and the health sector

These articles accompany the [UK Climate Change Statistics Portal](#), which similarly includes data from across the wider Government Statistical Service.

We are continuing to review this publication and engaging with users and the public to ensure it continues to provide insights into climate change in the UK. Please share any feedback or suggestions for future publications with us at environment@ons.gov.uk.

11 . Related links

[UK Climate Change Statistics Portal](#)

Portal | Regularly updated

A prototype portal for data and insights on climate change on GOV.UK.

[UK Environmental Accounts: 2022](#)

Bulletin | Released 9 June 2022

Measuring the contribution of the environment to the economy, the impact of economic activity on the environment, and society's response to environmental issues. Satellite accounts to the main UK National Accounts.